Pathology – Research and Practice 213 (2017) 286–291

Contents lists available at ScienceDirect

Pathology – Research and Practice

journal homepage: www.elsevier.com/locate/prp

Case report

Glomerulocystic kidney presenting as a unilateral kidney mass in a newborn with tuberous sclerosis: Report of a case and review of the literature

Miguel Rito*, Rafael Adame Cabrera

Serviço de Anatomia Patológica, Instituto Português de Oncologia de Lisboa Francisco Gentil, E.P.E., Lisboa, Portugal

ARTICLE INFO

Article history:
Received 17 October 2016
Accepted 11 November 2016

Keywords:
Tuberous sclerosis complex
Glomerulocystic kidney

ABSTRACT

Glomerular cysts are defined as a 2–3 times dilation of Bowman spaces and their presence in at least 5% of the glomeruli defines the kidneys as glomerulocystic (GCK). The association between cystic kidney disease and the tuberous sclerosis complex (TSC) is well known, but its presentation as a unilateral mass with glomerulocystic pattern is rare. We describe a case of an infant with a prenatal diagnosis of TSC, with a renal mass that was believed to be a renal tumor.

A four-month-old infant with maternal history of TSC and prenatally diagnosed subependymal nodules and a right renal mass underwent nephrectomy. Histopathology revealed a segmental GCK with epithelial hyperplasia of the tubules and cysts. A diagnosis of TSC associated GCK was rendered. Eight other cases with similar histopathological findings were found in the literature, two of which presented as a localized mass. Usually there is no family history but the pathologic findings are similar.

Awareness of the entity and its presentation as a localized mass may aid in the differential diagnosis of renal masses in infants. The pre-operative diagnosis of GCK is difficult and relies on a high degree of clinical awareness and imaging skills. Its presence should prompt the search for its etiology, particularly the exclusion of a heritable cause. The hyperplastic tubular epithelium within the glomerular cysts found in ours and other reported cases seems so characteristic that may serve as a major clue for the diagnosis of TSC.

1. Introduction

Glomerular cysts are defined as a 2–3 times dilation of Bowman spaces, and their presence in at least 5% of the glomeruli defines the kidneys as glomerulocystic [3]. Glomerulocystic kidney (GCK) is not a disease but rather a phenotypic description, where the glomerular cysts are the major pathologic feature. It comprises several etiologies that can be classified, as suggested by Lennerz et al. [18], in 5 major categories: associated with polycystic kidney disease; hereditary or familial subtype, where GCK is usually the major anomaly (the so called "GCK disease"); associated with well characterized syndromes, like the tuberous sclerosis complex (TSC); obstructive; and sporadic. The most relevant aspect of GCK is, in fact, the exclusion of the presence of a heritable cause [18].

TSC is an autosomal dominant syndrome caused by mutations in the *TSC1* and *TSC2* genes [1,38], that encode two proteins called hamartin and tuberin, respectively (there is also a minor percentage of patients that does not have an identified mutation [8]). These 2 proteins function together to inhibit mammalian target of rapamycin (mTOR)-mediated signaling and its malfunction leads to an aberrant high level of mTOR-mediated signaling to downstream targets, disturbing the control of cell growth, proliferation, and survival [17,36]. It is characterized by neurologic disorders, hamartomatous lesions and benign tumors in multiple organs including the central nervous system, skin, heart, kidney and lung, although the clinical spectrum of the disease is wide, with variable presentations [7]. The mutation involved influences the clinical presentation, as patients with *TSC2* mutation have generally more severe disease [8].

In TSC patients, the most common renal anomaly is the presence of angiomyolipomas, followed by renal cysts [8,11]. Renal cell carcinoma has also been described and at a younger age, but the overall risk is identical to the normal population [14,37]. Renal cystic lesions range in severity from microscopic disease to a polycys-

* Corresponding author at: Serviço de Anatomia Patológica, Instituto Português de Oncologia de Lisboa, Francisco Gentil, E.P.E., Rua Professor Lima Basto, 1099-023 Lisboa, Portugal.
E-mail address: miguelrito@gmail.com (M. Rito).

http://dx.doi.org/10.1016/j.prp.2016.11.011
0344-0338/

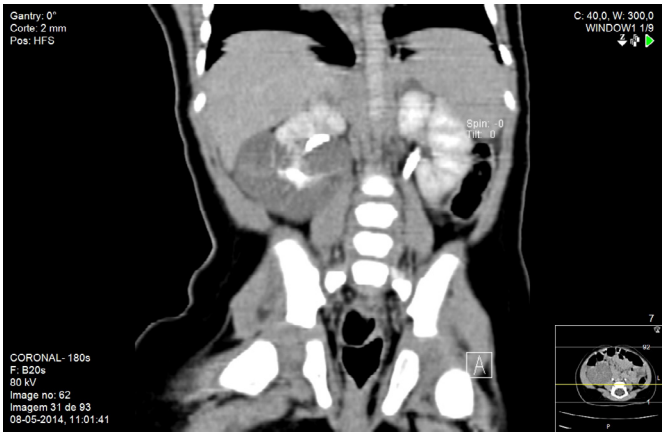

Fig. 1. CT scan showed an expansive lesion in the lower pole of the right kidney.

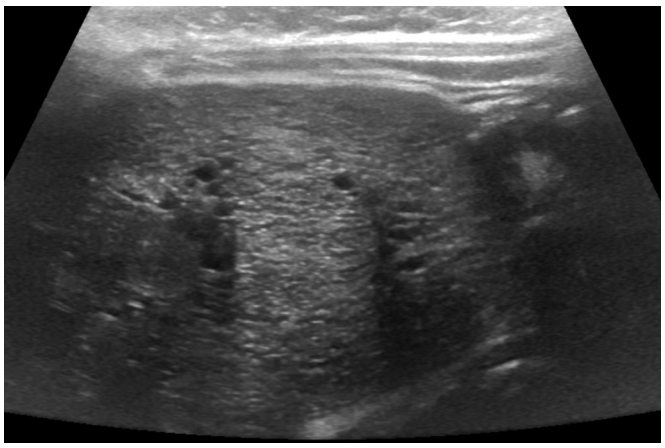

Fig. 2. US scan revealed uncountable millimetric cysts.

tic phenotype—*TSC2* and *PKD1* genes lie adjacent on chromosome 16p13 and can be deleted, creating a clinical picture of renal cysts with clinical and radiologic features characteristic of autosomal dominant polycystic kidney disease [6,21,32]—but usually the renal cysts are asymptomatic [11]. Furthermore, children with TSC are typically born with normal kidneys, with disease appearing as they age [10]. The association of TSC and glomerular cysts has been recognized for a long time [5] but its presence as a dominant feature – *i.e.* as a GCK – and in a neonate has only been reported a few times in the English literature [4,12,23,24,30,31,33,39].

Here we describe a case of an atypical presentation of GCK associated with TSC, along with a brief review of the literature (based on *PubMed* search), emphasizing the differential diagnosis of kidney lesions in newborns.

2. Case report

A 19-year-old Angolan pregnant woman (G1P1), with TSC diagnosed at 6 years of age, had her pregnancy followed at a high risk obstetric consultation. A routine ultrasound identified a male child with an apparent thickening of the interatrial septum. This finding lead to an MRI (at 30 weeks and 4 days of pregnancy) which detected subependimary nodules and cortical tubers, consistent with TSC, and a heterogeneous lesion in the lower pole of the right kidney, with apparent millimetric lipidic foci, suggestive of angiomyolipoma.

The pregnancy was brought to term without complications and the child was born by vaginal delivery, after spontaneous rupture of membranes, at 39 weeks and 3 days, with 2800 g and an APGAR score of 9/10.

At 3 and half months of age, during a control kidney ultrasound (US), an increase in the size of the kidney mass was detected. At this time, it measured 55 mm and was described as solid, heterogeneous, with small cystic areas, occupying the lower 2/3 of the kidney. A subsequent CT scan was performed and it was further characterized as having a cleavage plane with adjacent organs (Fig. 1). The child was referred to our institution with a presumptive diagnosis of angiomyolipoma.

At arrival another US was performed and the lesion was described again as having uncountable millimetric cysts (Fig. 2), suggestive of cystic nephroma.

At 4 and half months, the child underwent a right nephrectomy. On gross examination, the kidney weighed 49 g and measured 6,5 × 4 × 3 cm. It had a 4,3 cm spongiform tumour-like mass in the lower pole composed of numerous 1 mm to 3 mm cysts filled with clear transparent fluid (Fig. 3). Microscopically, this mass showed expansion of the cortex due to the presence of innumerable glomerular cysts, associated with Bowman's capsule and tubular epithelial hyperplasia (Figs. 4 and 5). The epithelial cells of the tubules had ample granular cytoplasm. The remaining parenchyma was unremarkable. These features were consistent with syndromic GCK associated with TSC.

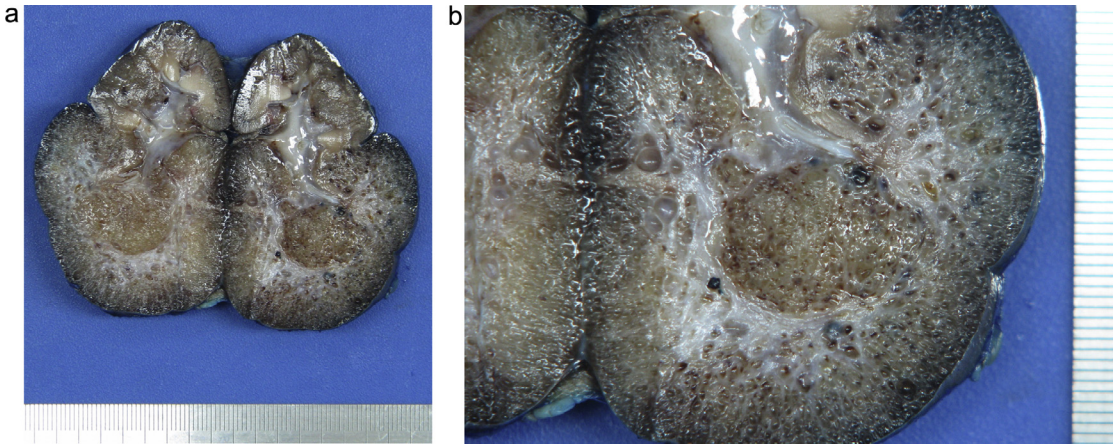

Fig. 3. a) Gross examination showed a spongiform tumour-like mass in the lower pole of the kidney, b) The lesion was composed composed of numerous cysts filled with clear transparent fluid.